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Social Security and Income Redistribution in Urban China 1995-2002

- An Empirical Analysis Based on Annual and Lifetime Income -

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Social Security and Income Redistribution in Urban China 1995-2002

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Abstract

In the late 1990s, the social security system in urban China, including pension system, medical insurance system, etc., was thoroughly reformed. This paper, using nationally representative urban household surveys for 1995 and 2002, investigates the redistributive effect of the social security reform in urban China. The main findings are as follows. First, it is confirmed that the urban social security system has an equalizing distributive effect and it reduces the relative poverty rate. Second, the positive redistributive effect of the social security system is achieved mainly through intergenerational redistribution, rather than by reallocating across different income groups. The progressivity of social security contribution is low, which resulted in a limited level of income transfer from the rich to the poor through the social security system. Third, the equalizing effect of the pension system decreased in 2002 as compared with 1995 and there was an increase in relative poverty. Fourth, assuming that the reformed policy were applied to public sector employees, the long-term redistributive effect of the pension system for the working population, as calculated using their lifetime income would be larger than its effect when examined using annual income data.

Keywords: social security, income redistribution, intergenerational transfer, long-term effect of the pension system, urban China

JEL Classification: D31, H55, I38

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1. Introduction

The rapid growth in China brought about by economic reforms was accompanied by a dramatic widening of the income gap, which is reflected in an increase in the Gini index of personal income from 0.3 in the 1980s to 0.45 at the beginning of the new millennium (Yin et al. 2006). The search for ways to establish and implement a redistribution policy that can effectively bridge the income gap has become a research and political problem of eminent importance.

Income redistribution can be achieved by the implementation of tax and social security policies. The Chinese government first levied personal income tax in 1993, but has not imposed any personal wealth redistribution taxes such as inheritance tax yet. Hence, the redistributive effect of the present tax policy remains limited. In terms of social security, China first started the reforms of the urban employees' pension system, medical insurance and other social security policies in the 1980s. Many other social aid policies such as work-related accident insurance and system of minimum living standard guarantee (SMLG) were subsequently established in urban China. Among these social aid policies, some, such as the minimum living standard guarantee, were directly funded by the treasury of the central government, which should belong to the category of direct income redistribution. Others like the pension system obtained their funds directly from its participants—employers and employees. However, the pension system in China has a mixed structure of pay-as-you-go (PAYG) and funded, which allows for both intragenerational and intergenerational income redistribution.

Did the social security policies narrow the income gap? Did its effects differ across the population? Or did it benefit the lower income group and lead to a decrease in relative poverty? Did the reforms in the late 1990s alter its income redistributive effects? These are some of the crucial questions that have rarely been studied in empirical studies.

Many studies on income disparity in China have been published. Some recent works include Gustafsson, Li, and Sicular (2008), Khan and Riskin (2005), Sicular et al. (2007), Yin et al. (2006), etc. These studies provided insights into the changes in China's structure of income distribution, urban–rural and regional income disparity, and mobility. For example, in their re-estimation of income disparity between urban and rural China, Li and Luo (2007) included all types of invisible income (e.g., social security transfers) into urban residents' total income. Xia et al. (2007) analyzed the trend and pattern of Chinese urban poverty.

However, research on the benefit disparity and the redistributive effect of the social security system were overlooked. He (2004) investigated the regional and occupational disparities of pension benefits; Wei and Gustafsson (2005) found inequality in medical expenses between urban and rural residents and among different regions (eastern, middle and western regions) of China; Ren et al. (2004) conducted a macro study on the intergenerational imbalance of the pension system using generational accounting. He (2007), however, utilized only one year's micro data to examine differences in the income transfer effects among several pension plans. Nonetheless, these studies each focused on one particular aspect of the social security system only, and have not examined the total redistributive effect of all social security policies and how much it affects the degree of income inequality.

The database used in our analysis is micro data obtained from the 1995 and 2002 urban households surveys (China Households Income Project, CHIP for short) carried out by the Institute of Economics, Chinese Academy of Social Sciences. With these data, we estimate the redistributive effect of the social security system through changes in the income Gini coefficients caused by implementation of pension benefits and medical insurance and so on.

The major reforms in the Chinese pension system and medical insurance policies took place in 1997 and 1998 respectively, whereas the SMLG was first established in 1999. We select two years of CHIP data that were gathered before and after these events, and try to observe the redistributive effect of the social security system by comparing these two sets of data[1]. To learn more about this effect, we calculate its value separately on workers and retirees. There is one thing we should note: contribution and payment of pensions occurs in different stages in an individual's lifecycle, so we need two sets of estimations, each using annual income or lifetime income. From annual income data, we can observe the redistributive effects of the pension system on current income, while the long-term effects can be evaluated by utilizing lifetime income[2].

The rest of this paper proceeds as follows. Section 2 introduces relevant concepts and empirical methodologies. Section 3 estimates the intrageneration and intergeneration redistributive effects of the social security system, based on individual income in a certain year. Section 4 studies the long-term redistributive effects of the Chinese pension system with

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[1] Because of the difference between the urban and rural social security systems, this essay focuses on the urban social security system.

[2] Further discussion of this point of view is continued in the second chapter.

lifetime income, and compares the different degree of income redistributive effects of various pension plans. Section 5 concludes.

2. Concepts, methodologies and data

To discuss redistribution policy, we first need to define the concepts of initial income and redistributed income. Initial income means the total earnings of the individual prior to redistribution derived from either labor or returns on assets, and includes income from wages, interest, commercial insurance, income-in-kind, etc. However, redistributed income equals initial income, net of taxes, plus the individual's social security benefit. The social security benefit includes not only cash benefits such as pension payments, but also noncash benefits such as medical treatment, education and services. In China, subsidized public housing is also considered a form of in-kind payment. The taxes that we mentioned include income tax, assets tax and social security costs (e.g., pension contributions and medical insurance costs). By comparing initial income and redistributed income, we can observe the effects of the redistribution policies.

The Chinese government, as mentioned above, imposed only a limited number of personal taxes, so this essay ignores the changes in taxation policy and focuses only on the redistributive effects of the social security system. Serving as a preliminary study, we do not consider noncash incomes and benefits[3]. The components of initial income are defined as follows: salaries/wages, net income of private businesses, property income, alimony (for the aged), private insurance benefits and other minor sources. Here, we consider two different types of redistributed income. One includes all social security programs, the other is restricted to the pension system only[4]. Their definitions are as follows.

Redistributed income 1 = Initial income + social security benefits (pension benefits, social relief that includes the minimum living standard guarantee, unemployment insurance, medical expenses paid by public sources) – social security costs

Redistributed income 2 = initial income + pension benefit – pension contribution

[3] Data of the portion of medical expenses paid by public sources is in the survey. In the following analysis, we included it in the redistributed income as a medical related cash payment.

[4] It should be noted that the composition of the initial income and the redistributed income used here is different from the "gross income" and "disposable income" used in Atkinson et al. (1995). Our initial income does not include transferred income from public policy and social security. Our redistributed income includes personal income tax.

We pay closer attention to pensions in the estimations of retirees because it is the main source of income for most senior citizens. As we mentioned, pensions have a unique character that differs from the other social securities. Its costs and benefits occur in both employed and unemployed states. In other words, it is a policy that redistributes income throughout one's life. Thus, evaluating pensions with income data from a single year would be incomprehensive, and estimations of total net pension benefit based on lifetime income can be used as a complement. Nelissen (1998) explicitly argued the necessity of using both annual income and lifetime income. Thus, the "Redistributed income 2" is calculated under both concepts and so is the redistributive effects of the pension policy[5].

We also face the dilemma of whether to calculate on an individual or family level. Personal data would be more appropriate in measuring personal utility growth from income growth. Fortunately, Chinese social security policies such as pensions and medical insurance are conducted on an individual basis[6]. Thus, we decided to use individual data. We only need household data when measuring the different redistributive effect of each household type.

The basic method of estimating the redistributive effects of the social security system is to compare the inequality of initial income and redistributed income. Firstly, we utilize a classical Musgrave and Thin Index (MT)[7] to estimate absolute changes in the degrees of income inequality, defined as follows:

$$MT = G - G^*. \tag{1}$$

G represents the Gini index for initial income while G^* is the Gini index for redistributed income. A positive MT indicates that the social security system reduces inequality and has a positive redistributive effect; a negative MT indicates an increase in income inequality, signifying a negative redistributive effect. A redistributive coefficient R is also introduced to estimate the relative changes in the degree of income inequality.

$$R = MT/G \times 100 \tag{2}$$

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[5] Many papers worldwide studied the redistributive effects of social security systems from both perspectives. See, for example, Nelissen (1998, 2000), Coronado et al. (2000, 2002), Oshio (2002, 2005).

[6] Social welfare schemes such as the minimum living standard guarantee are administered by families. However, the proportion of the sample that received the minimum living standard guarantee is low (1.6% in 2002 and 0.2% in 1995) and the amount is divided among family members.

[7] This measurement was first introduced in Musgrave and Thin (1948). Coronado et al. (2000) used its transformed version to estimate effective progression (EP).

Next, we utilize the relative poverty rate (*PR)* to further estimate the redistributive effects on the middle and lower income groups. This method is frequently used in similar studies by the OECD, EU and other international organizations.

$$PR = Np/N \times 100 \quad (3)$$

N refers to the whole population, while *Np* is the population that earns less than half of the median income of the whole population.

The 1995 and 2002 CHIP data cover 6,931 families (21,696 individuals) from 11 provinces and 6,835 families (20,632 individuals) from 12 provinces, respectively. The survey questions include individual characteristics, individual income and family assets. For every survey year, we can obtain individual information on age, every source of personal income, status of employment, the ownership and field of the company he/she works in, etc. For detailed information about these two surveys, please refer to Li et al. (2007). Because the focus of our study is the redistributive effects on workers and retirees in urban China, we selected individuals more than 16 years of age with urban residence, and eliminated samples that are classified as "currently a full-time student", "awaiting job assignment or school admission", "stay-at-home labor", and those whose income information is missing. As a result of this exclusion, the initial income and redistributed income of all samples in both years are positive. The sample size after the adjustment is 16,032 for 1995 and 15,248 for 2002.

3. Redistributive effects based on annual income

This section estimates the effects of China's social security system by utilizing the personal income data defined in the previous section. We point out two aspects of the income redistributive effects of the social security system: among income groups and across generations.

3.1 Different income groups

First, let us observe the different redistributive effects on different income groups. In particular, we are interested in finding out if the income of the lower percentiles has increased. To do so, we divide the population into 10 deciles based on the initial income levels. The

pretreatment and protreatment characteristics of the samples in 1997 and 2002 are summarized respectively in Table 1.

Table 1 shows:

a) For both 1995 and 2002, individuals with an income level lower than the sixth decile experienced improvements in their income. The lowest group's redistributed income increased by 8 to 9 times compared with initial income in 1995, and 5 to 6 times in 2002. In contrast, the other groups did not experience significant improvements.

b) Compared with 1995, the rate of improvement for all deciles declined in 2002. This is because of the huge social security system reform that took place in the late 1990s, which increased the personal burden for pension contributions and medical costs. The decline observed in all of the deciles for year 2002 reflected the effect of the reform.

c) In 1995, every group enjoyed a better redistributed income, including the top group. In particular, "redistributed income 1", which includes medical expenses, revealed an improvement of even greater magnitude. However, this situation changed in 2002, with the highest income group reporting a negative improvement rate. This clearly points to the fact that part of the income from the higher deciles was redistributed to the lower deciles. However, the amount is small, which means the progressivity of China's social security system is still low. The redistributive rate 1 is higher than –1% (higher than redistributive rate 2), indicating that the highest income groups still received positive transfers from social securities such as medical insurance.

Table1 Income redistribution for initial income deciles

Decile Groups (From lowest to highest)		1	2	3	4	5	6	7	8	9	10
2002	Initial Income	855.2	3283.7	4982.1	6437.7	7987.7	9701.1	11591.2	13797.1	17121.7	28330.8
	Redistributed Income 1	5995.0	4472.3	5579.8	6857.7	8270.2	9777.9	11552.6	13854.5	17082.2	28088.2
	Redistributed Income 2	5502.9	4280.5	5379.6	6690.8	8056.2	9563.4	11366.7	13605.7	16750.4	27687.6
	Percentage Improvement 1	601.0	36.2	12.0	6.5	3.5	0.8	-0.3	0.4	-0.2	-0.9
	Percentage Improvement 2	543.5	30.4	8.0	3.9	0.9	-1.4	-1.9	-1.4	-2.2	-2.3
1995	Initial Income	455.1	2131.3	3491.8	4470.0	5314.7	6151.8	7099.7	8304.8	10079.8	16153.1
	Redistributed Income 1	4767.7	3784.1	4206.8	4898.6	5739.2	6531.5	7474.6	8704.7	10485.6	16653.1
	Redistributed Income 2	4338.7	3535.3	4028.1	4695.8	5497.9	6256.3	7151.4	8325.5	10093.5	16190.0
	Percentage Improvement 1	947.6	77.6	20.5	9.6	8.0	6.2	5.3	4.8	4.0	3.1
	Percentage Improvement 2	853.3	65.9	15.4	5.1	3.4	1.7	0.7	0.2	0.1	0.2

Percentage Improvement 1 = (Redistributed Income 1-Initial Income)/Initial Income *100

Percentage Improvement 2 = (Redistributed Income 2-Initial Income)/Initial Income *100

Annual income (Yuan) at 2002 price is used.

Source: Urban household sample survey was conducted by the Income Distribution Research Team of the Institute of Economics of Chinese Academy of Social Sciences (CHIP CASS Database) in 1995 and 2002.

Unless otherwise stated, the diagrams below were drawn using data from CHIP CASS Database.

In order to observe the effects of the social security system on the lower income deciles, we also calculated the relative poverty rate (PR) for each income group. In 2002, the PR for initial income and redistributed income 1 was 21.1% and 15.6%, respectively. In 1995, it was 19.8% and 13.2%, respectively. In both years, the drop in the PR was around 6%, however the PR indexes in 2002 for both initial and redistributed income have increased relative to those in 1995, indicating that the income of the lowest income group has increased.

3.2 Intergenerational comparison

To examine the redistributive effect of the social security system by age cohorts, we have calculated the initial income and redistributed income in 1995 and 2002 for each age cohort. There appears to be a reversal of trend in both initial income and redistributed income at age 50–54. The redistributed income for those above 55 years of age exceeds their initial income, and vice versa for those who are 54 and below. The initial and redistributed incomes for each age cohort are shown in Figure 1. The horizontal axis represents the age cohorts, while the vertical axis indicates the ratio of initial income and redistributed income for each age cohort, with the average value of the full sample formalized to 100. In Figure 1, the initial income for those above 55 years of age is lower than the average. The older the age, the smaller the ratio. Yet, with income redistribution, senior citizens were able to received transfers such as pensions, thus significantly increasing their income. For example, in 1995, the initial income of individuals age 60–64 was only 46% of the average, but their redistributed income reached 103%, that is, basically the average level. On the contrary, by paying for the pension, medical insurance and other social welfare schemes, those under 54 years of age transferred part of their income out, and had a lower redistributed income as compared with their initial income. However, the decrease is moderate, and was kept within 10%. The retirement age of urban females is 50 or 55 years, while for males it is 60 years. From Figure 1, we conclude that in both 1995 and 2002, China's social security system mainly redistributed income intergenerationally, which is between the working and retired populations. There is very little observable redistribution of income within different age cohorts of the working population.

Thus far, we have analyzed the Chinese social security system's impact on different groups of people by comparing absolute changes in income. Now we turn to income inequality. The one-child policy was launched in 1979, because the average size of Chinese families had

decreased while the number of nuclear families had increased.[8] With the aging of the population, families made up of couples or individuals older than 65 years of age had also increased. The total number was reported to be 14% of all families in urban areas in the China National Census of 2000. To afford a closer look at the redistributive effects of the social security system on different family types, we not only analyze the changes in income disparity for the whole sample, but also analyze the changes for nuclear families and elderly families separately. A nuclear family is defined as a family with three members, a male aged between 20 and 59, a female aged between 20 and 49 and a child below 16. An elderly family, as defined by Chinese law concerning pension age, is a two-person family that comprises a male at least 55 and a female above 50. Table 2 summarizes the degree of increase in the Gini index because of income redistribution from the social security system. The top half of the table displays the results of the whole sample, while the lower half shows the results of the two special categories of families defined above.

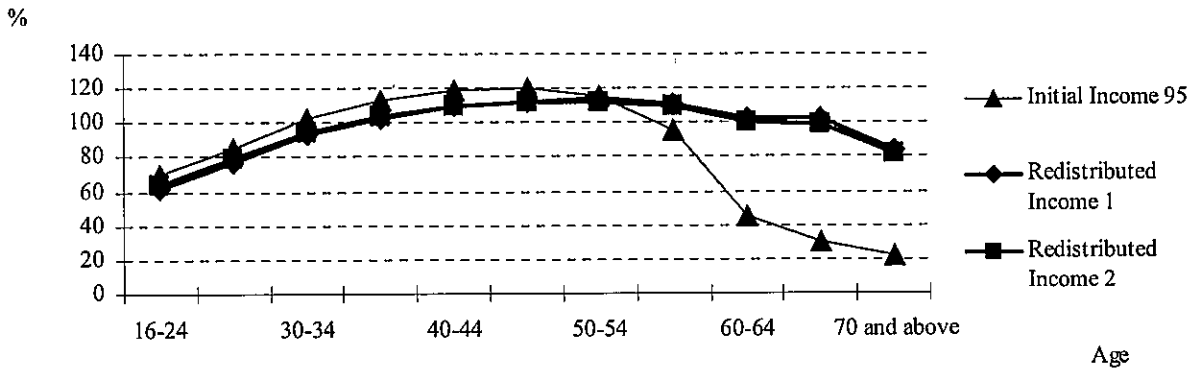

Figure 1-a Income redistribution by age for 1995

[8] A nuclear family is comprised of a husband and wife and their unmarried children.

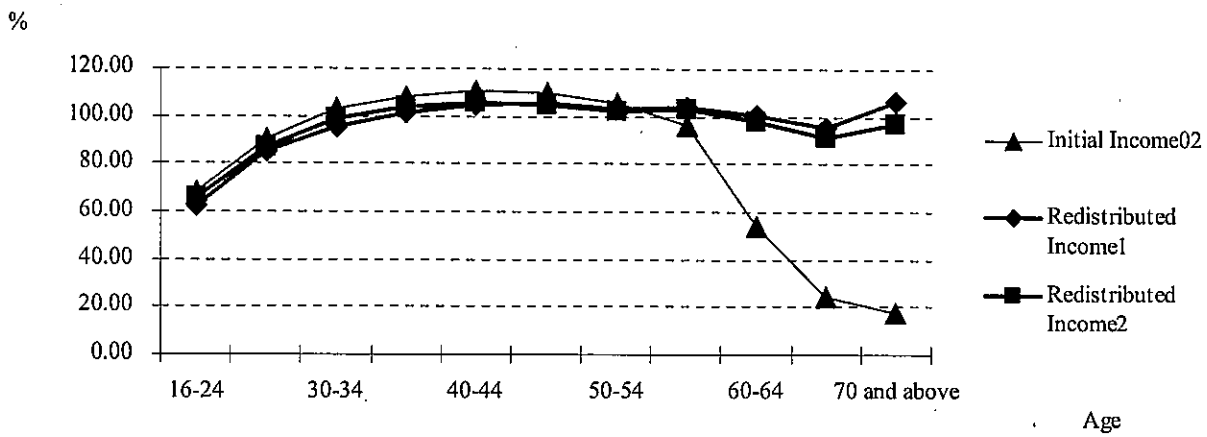

Figure 1-b Income redistribution by age for 2002

Several trends can be observed in Table 2:

a) As a whole, the income gap was diminished by the social security system, which has positive redistributive effects. However, we should not neglect the diversity of their magnitudes when we look at different social groups. Social security, which worked well in closing the income gap among elderly families, has a redistributive coefficient as high as 50%, but its effect on nuclear families is small. In fact, the redistributive coefficient is –1%, signifying a slight increase in the income gap.

b) By observing the differences between 1995 and 2002, we notice that the redistributive coefficient decreased from 14.03% to 9.26%, signifying a drop in the redistributive effect. This trend is consistent with our earlier analysis using income deciles. We also discovered a similar reform effect, as the redistributive effects of China's social security system had weakened in 2002.

c) The redistributive effect of the pension system alone was larger than that of the social security system as a whole. This conclusion is valid regardless of the time of observation (1995 or 2002) or the social groups being observed (nuclear and elderly families), which is also proven by Table 2, in that redistributive coefficient 2 is always larger than redistributive coefficient 1. The difference between these two coefficients was also larger in 2002. In 1995, the difference was 1.63% and it increased to 2.09% in 2002. From this evidence, we conclude that the redistribution effects of social security policies other than the pension system had weakened the redistribution.

Table 2 Improvement in income disparity(gini index) due to redistributive effects of social security system

	Formula	1995	2002
Full Sample			
Gini Index for Initial Income	G1	0.3679	0.3970
Gini Index for Redistributed Income 1	G1*	0.3163	0.3602
MT1	(G1-G1*)	0.0516	0.0368
Redistributive Coefficient R1	MT1/G1×100	14.03	9.26
Gini Index for Redistributed Income 2	G2*	0.3103	0.3519
MT2	(G1-G2*)	0.0576	0.0450
Redistributive Coefficient R2	MT2/G1×100	15.66	11.35
Nuclear Family			
Gini Index for Initial Income	Gn	0.2507	0.3050
Gini Index for Redistributed Income 1	Gn1*	0.2516	0.3106
MT1-nuclear	(Gn-Gn1*)	-0.0008	-0.0055
Redistributive Coefficient R1-nuclear	MT1-nuclear/Gn×100	-0.34	-1.82
Gini Index for Redistributed Income 2	Gn2*	0.2489	0.3052
MT2-nuclear	(Gn-Gn2*)	0.0018	-0.0001
Redistributive Coefficient R2-nuclear	MT2-nuclear/Gn×100	0.73	-0.04
Elderly Family			
Gini Index for Initial Income	Go	0.5781	0.5688
Gini Index for Redistributed Income 1	Go1*	0.2453	0.3081
MT1-old	(Go-Go1*)	0.3328	0.2607
Redistributive Coefficient R1-old	MT1-old/Go×100	57.57	45.84
Gini Index for Redistributed Income 2	Go2*	0.2390	0.2957
MT2-old	(Go-Go2*)	0.3391	0.2731
Redistributive Coefficient R2-old	MT2-old/Go×100	58.66	48.01

Note: The definition of Nuclear and Elderly Families as defined by Chinese Law concerning Pension Age:
Nuclear Family = Male (20-54 of age) + Female (20-49 of age) + One Child (below age 16)
Elderly Family = Male (Above 55 of age) + Female (Above 50 of age)

4. Redistributive effects based on lifetime income

As noted earlier, the cost and benefit of the pension system changes at different stages of the lifecycle. Therefore, it takes a life long process to uncover its overall effect. It is thus necessary to investigate it from a fixed point of time as well as from a lifelong perspective. From a theoretical stance, the redistribution through the pension system can be understood as follows. The individual earns the right to receive a pension after retirement by participating in the public pension system, thus accumulating pension assets. However, when operating under a PAYG system, the level of pension one receives and the contributions one pays are determined by population growth rates and wages at each time period. As such, the actuarial

present value of costs and the actuarial present value of benefits could be different. This margin is called the net benefit, which reflects the lifetime cost versus benefit, and therefore is the total redistributional transfer through the public pension system. The redistribution exists if the net benefit is not zero, and vice versa.

During the pension policy reform of 1997 (pension plan 1997), the Chinese government decided to develop a partially funded pension system which means that a mixed structure of PAYG and funded. Citizens with different backgrounds were required to contribute differently and in turn receive different pension payments. A change was made in December 2005 (pension plan 2005) to adjust the percentage that goes to the individual account and the ways to calculate and receive pension payments. This policy design would ensure income redistribution. In this section, we first use the personal income data to calculate the lifetime net benefit mentioned above. Then, we derive income disparity indexes (e.g., Gini index) in both pension and pension-free states. Finally, we analyze the effect a pension system has on inequality. In the following paragraphs, only the data for lifetime labor income is used; other income sources such as investments are ignored. In short, lifetime income means one's initial income equals his labor income and one's redistributed income equals initial income plus lifetime net benefits from pension payments.

Here, we used He's (2007) method to estimate lifetime labor income and net pension benefit. First, we estimate the labor income using individuals from the 1997 and 2002 surveys who are 20 to 59 years old earning a wage. We make the logarithmic wage the dependent variable and personal characteristics, such as education level, age, job type, the independent variables in the income function. Then, with the aid of the function, we predict annual income, hence, the individual's lifetime income distribution under a certain wage growth rate and interest rate hypotheses (refer to equation 4). From the distribution, we finally come up with the net pension benefits and contributions that apply to each pension plan[9].

$$LTW_i = \sum_{s=a_{0i}}^{R-1} \{[\hat{W}_{i(s)} \cdot (1+g_s)^{(s-a)}]/(1+r_s)^{(s-a)}\}. \qquad (4)$$

In equation 4, LTW_i is the discounted present value of worker i's lifetime wage income at year 2002, accumulated from the beginning of his/her working life at age a_0 to one year before

[9] See appendix table for details.

his/her retirement at R–1 years old. $\hat{W}_{i(s)}$ is the predicted labor income of worker i when he/she is s years old. "a" represents worker i's age in the year of the survey and R is the retirement age (60 for males, 55 for females). g_s is the real growth rate of the mean social wage when worker i is s years of age. r_s is the discount rate. In our estimation, for years preceding 2002 we use the national growth rate of the real wage g_s and the real one-year saving interest rate r_s [10]. After 2002, we assumed that g_s and r_s both have growth rates of 4%.

Because of space limitations, we only estimate the initial income and redistributed income of the 20–59-year-old samples in the 2002 survey data. In order to compare the redistributive effects of pension plan 1997 and pension plan 2005, we complete two sets of estimations according to these two sets of policies, namely the results redistributed income 1997 and redistributed income 2005. Interestingly, urban employees of the Chinese public sectors are still using the pre-1997 version of the unreformed pension policy. Therefore we utilize two different methods of calculation. In the first, we apply the new policy to public sectors employees; in the second, we maintain the pre-1997 reform version of the policy affecting those two groups (refer to Table 3).

Table3 Redistributive effects on lifetime income basis

	Gini index	MT(G-G*)	Redistributive Coefficient MT/G (%)
Initial Income	0.2757		
Redistributed Income 97A	0.2420	0.0337	12.22
Redistributed Income 05A	0.2360	0.0397	14.39
Redistributed Income 97B	0.2555	0.0202	7.33
Redistributed Income 05B	0.2542	0.0216	7.82

Note:
The sample consists of workers with labor income between 20-59 of age in 2002.
Initial Income = Present value of personal lifetime labor income in 2002.
Redistributed Income 97 = Initial income+ Present value of personal lifetime net benefits from pension system in 2002 calculated with pension plan 1997.
Redistributed Income 05 = Initial income+ Present value of personal lifetime net benefits from pension system in 2002 calculated with pension plan 2005.
A reflects the case when net benefits for whole sample is calculated with reformed policy.
B reflects the case when net benefits for public sector employees are calculated with old policy, while using reformed policy for the others.

From Table 3, it is obvious that the change in the Gini index of 2005's plan exceeds that of 1997's plan, signifying a more effective redistributive effect of the 2005 plan. However,

[10] Source:China Statistics Yearbook for 1990, 1993, 2002, 2003; Almanac of China's Finance and Banking for 1997, 2000, 2003.

whether the employees in government and nonprofit institutions join the reform process or not has a significant influence on the policies' general redistribution effect. If the reformed policy is applied to these civil servants, the income redistribution effect for 1997's plan would have increased by 67% and for 2005's plan by 84%.

In order to compare the annual and lifetime income based effects, we also utilize annual income from the same sample to calculate the Gini index for both initial and redistributed income. The results are 0.3417 and 0.3397, respectively, with a redistributive coefficient of 0.6%. The lowest redistributive coefficient reported in Table 3 is 7.33%. This implies that for the urban workers in China, if the redistributive effect of the pension system is evaluated with annual income, it could be negligible. However, if estimated with long-term income, the effect becomes much stronger. This implies that the pension system achieves a larger long-term redistributive effect compared with its immediate outcomes.

5. Conclusion

In this article, we used the CHIP database to estimate the income redistributive effects of the Chinese urban social security system from several new perspectives. Our findings, which could be referential to future redistribution policies, are as follows:

a) Generally, it can be concluded that with single-year or lifetime income, the social security system in urban China reduces the personal income gap and has a positive redistributive effect. However, most of the redistributions were achieved intergenerationally from the working population to retirees, rather than from high-income to low-income groups. Transfers taken away from the higher income group are low, which represents low progressivity in the social security's cost.

b) Compared with 1995, the social security system's ability to narrow the income gap was weaker in 2002. The redistribution index declined from 14.03% to 9.26%, while the relative poverty rate increased. Moreover, the pension's effect in bridging the income gap exceeded the combined effects of the pension and other social security policies (such as medical insurance).

c) In particular, we considered the long-term effect of pensions on urban residents of labor force, which was measured by lifetime income. We found that it is significantly larger than the short-term effect calculated with one year's income. We also noticed that the 2005

version of the pension policy was larger than the 1997 version in terms of the income redistributive effect. Furthermore, the outcome of the pension system reform would have been larger if the reform policy was applied to those working in public sectors (67% higher under pension plan 1997 and 84% higher under pension plan 2005).

In summary, the redistributive effect of the social security system in urban China is mainly achieved by intergenerational income redistribution. As a result, this system might encounter fiscal problems when low fertility and population ageing become more serious. This conclusion suggests an imminent need to search for other mechanisms to achieve income redistribution. If government officials expect social security to take on a bigger role in income redistribution, they should take into account the differences in the long-term and short-term effects of pensions when trying to constitute other policies. Finally, having a unified pension system for the entire urban labor market would be beneficial to the long-term redistributive effects of the pension system.

Appendix Table

Contribution and benefit structure in pension plan 1997 and 2005

Item		Old participants	In-between participants	New participants
Definition		personnel retired before 19977's reform	personnel retired after 1997's reform but started working before 1997's reform	personal started working after 1997's reform
Contribution	Pension plan 1997	N/A	28% of wage (contributed jointly by employee and employer), 11% of which is reserved in individual account	Same as the in-between group
	Pension plan 2005	N/A	28% of wage (contributed jointly by employee and employer), 8% of which is reserved in individual account	Same as the in-between group
Benefit	Pension plan 1997	Same as the pre-reform terms, which is x% of the individual standard retirement wage	**Basic pension** (20% of last year's average monthly wage of local employees) + **Individual account pension** (the amount of individual account savings/120)+**Transitional pension** (average indexed monthly earnings× modulus× years without an individual account	**Basic pension**(20% of last year's average monthly wage of local employees) + **Individual account pension** (the amount of individual account savings/120)
	Pension plan 2005	Same as the pre-reform terms, which is x% of the individual standard retirement wage	**Basic pension** (Years of contribution*1%*0.5(average indexed monthly earnings + last year's average monthly wage of local employees))+ **Individual account pension** (the amount of individual account savings / months of payment scheduled(depends on average life expectancy of urban population at the time of retirement & age of retirement))+**Transitional pension** (average indexed monthly earnings × modulus× years without an individual account	**Basic pension** (Years of contribution*1%*0.5 (average indexed monthly earnings + last year's average monthly wage of local employees))+ **Individual account pension** (the amount of individual account savings / months of payment scheduled(depends on average life expectancy of urban population at the time of retirement & age of retirement))

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